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AN EXPERIMENTAL ENQUIRY CONCERNING THE CONTENTS, QUALITIES, AND MEDICINAL VIRTUES, OF THE TWO MINERAL WATERS,

Lately diſcovered at

BAGNIGGE WELLS,

Near LONDON;

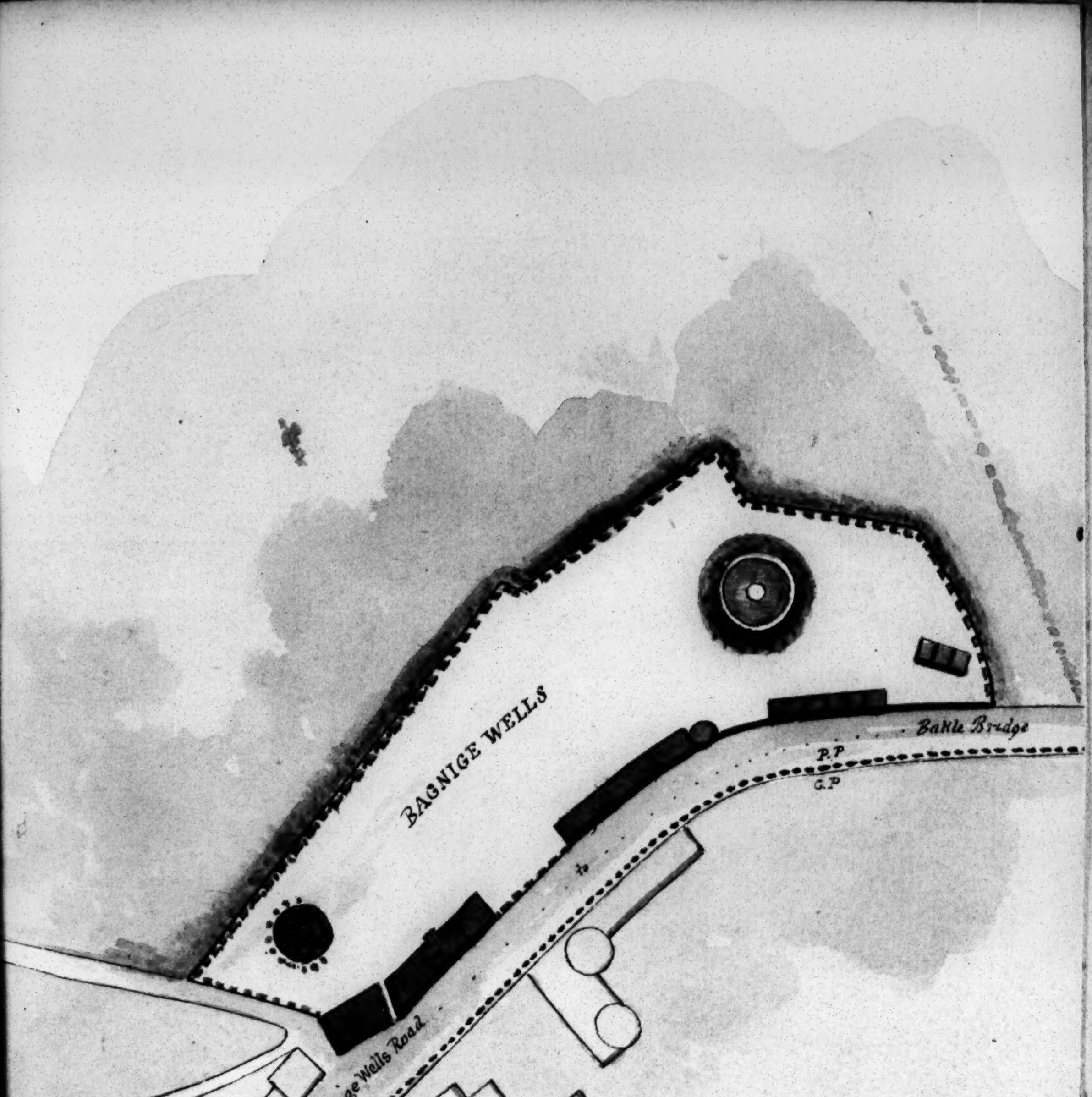
With Directions for Drinking them, and ſome Account of their Succeſs in obſtinate Caſes.

By JOHN BEVIS, M.D.
Fellow of the Royal Society, and of the Royal Academy of Sciences at Berlin.

The SECOND EDITION, with Additions.

> Siquidem D. O. M. ſummas et longe præſtantiſſimas in AQUIS recondidit ſoterias vires, quarum tanta eſt excellentia tantaque utilitas, ut longe multumque omnibus aliis remediorum generibus ſint ſuperiores, et, ſi ex vero dicere liceat quod res eſt, univerſalior AQUA non detur medicina.
>
> F. HOFFMANN, *De Element. Aquar. Mineral.*

LONDON:
Printed for J. NEWBERY in St *Paul's Church Yard*, and may be alſo had at the WELLS.
M.DCC.LXVII.


BAGNIGE WELLS
Battle Bridge
P.P
G.P
to
Bagnige Wells Road
Brook Place
P.P
G.P
Pancras Parish
ell Parish
Clerkenwell Prison

TO THE

RIGHT HONOURABLE

THE

Earl of MACCLESFIELD,

PRESIDENT;

AND TO THE

COUNCIL and FELLOWS

OF THE

ROYAL SOCIETY of LONDON,

As moſt adequate Judges of the Contents,

This Treatise is,

With all Deference, inſcribed

By their devoted Servant,

JOHN BEVIS.

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AN
EXPERIMENTAL
ENQUIRY
CONCERNING THE
CONTENTS, QUALITIES,
AND
MEDICINAL VIRTUES OF
BAGNIGGE WATERS.

INTRODUCTION.

Of the Situation, Soil, &c.

THESE wells are a little way out of London, in the high road from Coppice Row, or Sir John Oldcaſtle's, which, about a quarter of a mile further, at Battle-Bridge turnpike, comes into the great new road from Paddington to Iſlington, affording an eaſy acceſs to the ſprings for coaches from all parts: And the foot path from Tottenham Court Road, by Southampton-Row, Red-Lion-ſtreet and the Foundling Hoſpital, to Iſlington, Clerkenwell, and Old Street, running cloſe by the wells, is no leſs convenient for ſuch as prefer walking exercife.

The place where the waters iſſue, is environed with hills and riſing ground every way but to the ſouth, and, conſequently, ſcreened from the inclemency of the more chilling winds. Primroſe-hill riſes weſtward; on the north-weſt are the more diſtant elevations of Hampſtead and Highgate; on the notth and north eaſt there is a pretty ſudden aſcent to Iſlington and the New river head, and a near proſpect of London makes up the reſt of the circumference, with the magnificent ſtructure of St Paul's, full in front, and nearly upon a level with Bagnigge-houſe.*

Such a ſituation, however agreeable in itſelf, and favourable to the production and maintenance of

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* In ſome ancient deeds, the ground where this houſe ſtands is called Bagnigge Vale. On a ſquare ſtone, over an old Gothic portal taken down about three years ago, and now replaced over the door from the high road to the houſe, is cut the following inſcription.

+
S T
THIS IS BAGNIGGE
HOUSE NEARE
THE PINDER A
WAKEFEILDE
1680.

Over one of the chimney-pieces is the garter of the order of St George in rais'd work; and over another, the royal arms on one ſide, and on the other ſide the ſame arms joined with ſeveral more. Between them is the buſt of a woman in a Roman dreſs, let deep into a circular cavity of the wall, bordered with feſtoons of delf earth, in the natural colours, and glazed. It is ſaid to repreſent Mrs Eleanor Gwin, a favourite of Charles the ſecond, who ſometimes made this place her ſummer reſidence.

ſprings, ſhould ſeem, nevertheleſs, to expoſe their waters to be frequently contaminated and ſpoiled by inundations from large and ſudden rains: And yet that theſe ſprings ever ſuffer the leaſt damage on that account does not appear; ſince they are found to retain their genuine clearneſs, mineral flavours, and virtues, through all ſeaſons, and viciſſitudes of weather.

The floods, which at times roll down toward this ſpot, are all received and carried off quick, without ponding, by a rivulet, anciently called the River Fleet, which running near Pancras-church, and the Brill, paſſes under Battle-Bridge, and ſo on hard by the wells, to London, diſcharging itſelf into Fleet-ditch, and at laſt into the Thames. Add to this, that although it be difficult to dig hereabouts two or three feet deep without encountering ſprings, yet do the ſources of the wells lye ſo low, as to be inacceſſible to any percolations of rain or other waters, from or near the ſurface.

The neighbouring ſoil is various, as ſtiff blue clay, lime-ſtone, brick-makers earth, and, on the north, and north-eaſt eſpecially, plenty of red ſand, gravel, and ochre earth, out of which riſe many little ferrugineous ſprings, of a weak impregnation, ſcarce to be diſtinguiſhed as ſuch, but by their variegated film, and the yellow ſediment which they depoſit in trenches and ditches.

At what time theſe waters were firſt known to be poſſeſſed of ſalutary qualities, cannot be made out with any degree of evidence. A tradition goes, that the place of old was called Bleſſed Mary's Well; but that the name of the Holy Virgin having in ſome meaſure fallen into diſeſteem after the reformation, the title was altered to Black Mary's Well, as it now ſtands upon Mr Rocque's map, and then to

Black Mary's Hole; though there is a very different account of theſe later appellations; For there are thoſe who inſiſt they were taken from one Mary Woolaſton, whoſe occupation was attending at a well, now covered in, on an oppoſite eminence, by the foot way from Bagnigge to Iſlington, to ſupply the ſoldiery, encamped in the adjacent fields, with water. But waving ſuch uncertainties, it may be relied on for truth, that the preſent proprietor, upon taking poſſeſſion of the eſtate, found two wells thereon, both ſteaned in a workman-like manner; but when, or for what purpoſe they were ſunk, he is entirely ignorant. The waters of theſe wells, one of which purges, the other is a chalybeat, are the ſubjects of the preſent enquiry; and the uſe of the former being frequently directed as preparatory to that of the latter, I ſhall begin with it.

PART I.

Of the Bagnigge Purging Water.

In the year 1757, upon boiling ſome of this water in a tea-kettle, it was obſerved to turn whitiſh, and foul, which cauſed it to be rejected for culinary uſes. The ſame year, a man who attended the working of ſome ſnuff-mills, then erected cloſe to the well, happening to be feveriſh and thirſty, drank plentifully of the water, and found himſelf immoderately purged by it, which gave the firſt intimation of its cathartic quality.

The purging well is about two and twenty feet deep. There is not the leaſt appearance of any water trickling in through the junctures of the ſteaning, but it all ariſes from the very bottom, and comes in but ſlowly through a blue clay, as has been found by exhauſting it almoſt to dryneſs by continued pumping. What kind of ſtrata lye above the ſaid blue clay, I have not been able to learn.

The water, freſh from the pump, is remarkably clear and limpid, and diſcharges more air bubbles at the ſurface, than moſt waters do at the ſpring head, tho' farr ſhort of the Bagnigge chalybeat water in this reſpect. It never turns foul or depoſits any ſediment, or throws up any ſcum, if kept in clean veſſels, unleſs heated to a degree much beyond that of the warmth of any known climate.

It taſtes not diſagreeably in the mouth; but being ſwallowed, leaves a diſtinguiſhable brackiſh bitterneſs on the palate.

There is nothing remarkable in it as to ſmell, when cold.

On a cloudy day in Auguſt 1759, when Fahrenheit's thermometer hanging in the pump-room ſtood at 70, I took it down and immerged it ſucceſſively in the purging and chalybeat waters, both freſh pumped, as alſo, in the running water of a neighbouring ſpring, till it became ſtationary in each. In the firſt it ſtood at 53, in the ſecond at 63, and in the laſt at 58. Again in September, when the thermometer in the ſhade ſtood at 56, in the purging water it was at 50, and in the chalybeat at 59. Alſo from many other trials I found the inſtrument always ſeveral degrees lower in the purging water than in the chalybeat. November 20th being a hard froſt, the thermometer in the open air ſtood at 28, in the purging water at 40, in the chalybeat at 53, and in the ſpring at 49; and December 23, thermometer in air ſhewed 23, in the purging water 41, and in the chalybeat 53.

By a very nice glaſs hydrometer, equal volumes of diſtilled water, and of the purging water under the ſame degree of heat, weighed reſpectively 2915 and 2924 grains; whence the ſpecific gravity of diſtilled water to that of the purging water is as 1 to 1,0031; and very nearly the ſame proportion came out by the hydroſtatical balance.

A half pint glaſs of the freſh pumped purging water was placed under the receiver of an air pump, and remained there ſome minutes after the exhauſtion of the air; then it was taſted with another freſh glaſs of the ſame, and found not to be near ſo palatable as before, the bitter now manifeſting itſelf far more ſenſibly.

A bottle of this water, which among ſeveral others cork'd and wax'd, the proprietor had ſhip'd for Virginia in October 1758, came back and was brought to me in October 1759. It was then quite limpid, and without a particle of ſediment, nor was the taſte ſenſibly impaired. Three half pints of it had much the ſame purgative effect, as if freſh from the well.

Experiments on the purging water, in order to a diſcovery of its principles and contents.

EXPERIMENT I.

I put two London beer quarts of the freſh water from the pump, into a glaſs body of a proper capacity, to which was fitted a head and receiver, luted cloſe with ſtarch'd paper, and diſtilled with a ſand heat which barely kept the water ſimmering. In about three hours the body ſeemed to be left quite dry with ſome reſiduum at the bottom.

When the fire had been extinguiſhed long enough to let the glaſs body cool, I ſeparated the head,

and carefully took out the reſiduum, which being a little moiſt, I thoroughly dried it in a china ſaucer ſet on warm embers: It then weighed 135 grains.

The diſtilled water taken out of the receiver meaſured the ſame to all appearance as before the diſtillation, allowance being made for the bulk of the reſiduum, the little moiſture it retained, and what might probably exhale through the junctures before the paper grew dry; and it differed not upon any tryal from diſtilled river water.

Before the water began to ſimmer it turned turbid and whitiſh, and ſoon a clax was perceptible at the bottom of the glaſs veſſel, which for ſome time gradually increaſed, but ceaſed to do ſo a good while before the diſtillation was compleated.

A ſeemingly calcarious duſt alſo covered the greateſt part of the ſurface, but as ſoon as the water ſimmered, it ſunk.

Experiment II.

In order to obtain a good quantity of the ſalts of this water, I exhaled eight gallons of it in a well tinned copper boiler, to the conſumption of about two thirds. This was in the month of October 1759, when the weather was uncommonly hot, for the time of year; for the thermometer ſtood at 70. I took notice, that though I had regulated the fire to a very moderate boiling heat, yet the boiler was lined with a white duſt quite to the brim, which made me ſuſpect that ſome of it might eſcape in the evaporation: Wherefore I took out the remainder, carefully wiping up the ſubſidence and the white duſt from the ſides of the veſſel with a ſpunge which I ſoaked and ſqueezed out in the warm water. This water I poured by ſeveral portions into a thin hemiſpherical glaſs veſſel, having been the bottom part of a large retort, which I placed on the top of a tin kettle two third parts full of boiling water, ſo as to finiſh the exhalation with the gentle heat of a balneum vaporis, both to prevent the riſing of any of the ſolid contents, and to ſecure the reſiduum from ſuffering any alteration from being burnt or ſcorched at laſt. When the moiſture was near evaporated, and the magma began to grow ſtiff, I was obliged to be continually ſtirring it with a ſpoon to hinder it from ſticking to the glaſs, which I found it very apt to do: And as I could not keep my face clear of the aſcending fumes, I perceived a ſtrong rank ſcent towards the latter end, and was preſently after ſeized with a violent head ach; whether from thoſe effluvia, or from my being over heated, which laſted a fortnight, tho' I had ever been almoſt a ſtranger to ſuch a diſorder.

Upon carefully weighing the dry reſiduum immediately after it was taken from the fire, I found it 2385 grains, being 298 grains to a gallon, of a yellowiſh grey colour, little differing in appearance from that of the 1ſt experiment.

EXPERIMENT III.

I evaporated a ſingle gallon of the water freſh from the pump, continuing the operation from the beginning to the end, in balneo vaporis; and obtained no leſs than 392 grains of the like dry reſiduum, as in the former experiment; and in November, after a three days hard froſt, I got within a few grains of the ſame quantity from another gallon.

EXPERIMENT IV.

Into four ounces of the freſh water I poured a tea-ſpoonfull of diſtilled water, wherein ten drops of the ſyrup of violets had been diluted, and mixed them well with a feather. The mixture exhibited a weak green, or aquamarine, which continued the ſame the next day.

EXPERIMENT V.

Fifteen grains of good rhubarb in powder infuſed in the ſame quantity of the water, gave at firſt a beautiful clear yellow, which, by degrees, grew ſtronger and ſtronger, and the next day was a deep orange colour.

EXPERIMENT VI.

With two ounces of the water, a few drops of ol. tart. per deliq. ſtruck an exceeding white cloud; which condenſing for a conſiderable time, at length ſunk to the bottom, and, laſtly, aſſumed the appearance of an earthy powder.

EXPERIMENT VII.

The ſame quantity of the water, and the like number of drops of ſpirit of hartſhorn, produced a thin cloud, alſo pretty white, which diſcovered no tendency to precipitation all day, but was the next day found to have ſubſided.

EXPERIMENT VIII.

Spirit of ſal ammoniac, in the like manner, gave a white a white cloud, which ſoon began to ſink, and was precipitated in fifteen or twenty minutes.

EXPERIMENT IX.

Several drops of a ſolution of borax in diſtilled water, when mixed with this water, produced no ſenſible appearance at all.

EXPERIMENT X.

Two ounces of the water poured upon half a dram of dry cream of tartar excited no ebullition; but the mixture took a ſemi-opaque white, which laſted many hours without ſettling.

EXPERIMENT XI.

Two or three drops of the ſolution of pure ſilver in aqua fortis, let fall upon two ounces of the water, inſtantly ſtruck a thick and exceeding white cloud, which ſoon precipitated in a curd of the ſame colour, but, in a little while, altered to a pink colour at the upper ſurface, then to a purple, and, laſt of all, after ſome days, to a very deep purple, almoſt black.

EXPERIMENT XII.

About as many drops of a ſolution of quickſilver in ſpirit of nitre, ſtruck a thicker cloud than in the laſt experiment, and of a cream colour; which ſoon ſettled to the bottom in a compact curd, and in a few hours took the fine complexion of turpethum minerale, and held it ſeveral weeks.

Experiment XIII.

A ſolution of corroſive ſublimate, in diſtilled water, let fall very gradually into two ounces of the water, went directly to the bottom, without forming the leaſt cloud, turbidneſs, or ebullition, and without any appearance of ſediment. The ſides and bottom of the glaſs were lined with numbers of ſmall air-blebs.

Experiment XIV.

A ſolution of ſugar of lead in diſtilled water, produced, with only three drops on two ounces of the water, a white turbidneſs all over, which began to precipitate ſlowly in about half an hour, and at laſt appeared as a white powder.

Experiment XV.

A ſolution of alum in diſtilled water was very gradually dropt on two ounces of the water, as far as twenty drops, before a ſenſible turbidneſs was produced; it was no cloud, but rather diſtinct floating, and very minute particles, which, in about half an hour, ſubſided in a whitiſh powder.

Experiment XVI.

Strong oil of vitriol was let fall drop by drop on one ounce of the water; it ſunk quick to the bottom, and raiſed up infinite numbers of moſt minute air-bubbles, but without any notable efferveſcence, even when a quantity nearly equal to that of the water had been dropped in. When the ebullition ceaſed, the mixture was perfectly limpid, without the leaſt ſediment.

EXPERIMENT XVII.

Spirit of marine ſalt was dropped on in like manner, with much the like ſucceſs, except that here plenty of whitiſh fumes aroſe.

EXPERIMENT XVIII.

Three or four drops of an infuſion of galls, made by pouring a pint of boiling water on half an ounce of the nuts in powder, produced with ſix ounces of the purging water but a very ſlight alteration; by giving it a tinge of its own brown colour, but the next day it was turned of a deep dirty green, and deeper ſtill a day or two after.

EXPERIMENT XIX.

Aſh bark, freſh ſcraped from a dry ſtick, after two hours, turned the water of a dirty greeniſh blue.

EXPERIMENT XX.

I ſoaked a pound of raw lean beef in a gallon of the water three days, and then boiled them together three quarters of an hour. The outſide of the fleſh looked more red than if it had been impregnated with common ſalt, and the inſide was throughout of a deep red.

EXPERIMENT XXI.

The water would not lather, cold or hot, with any ſoap I could procure, but felt very harſh, and curdled ſtrongly.

EXPERIMENT XXII.

Being boiled with an equal part of new milk, the mixture turned to curds and whey.

Experiments on the dry reſiduum of the purging Water.

EXPERIMENT XXIII.

I taſted the yellowiſh grey ſediment left after a gentle exhalation of the purging water of the 3d. experiment, and found it at the tip of my tongue to have a ſtrong reliſh of common ſea ſalt, but as it diſſolved in my mouth, its taſte was nauſeouſly bitter, not much unlike that of the artificial Epſom ſalt of the ſhops, but more diſagreeable.

EXPERIMENT XXIV.

Ten grains of this reſiduum being left in a watch glaſs in damp weather began to relent in a few hours, though in a room where there was a fire, and the next morning ſeemed much diſſolved, except the earthy part which ſubſided.

EXPERIMENT XXV.

Four drops of ſyrup of violets rubbed in an agate mortar with ten grains of the reſiduum, the mixture preſently became of a feint green, and continued much the ſame for eight and forty hours; perhaps this might be from the yellow of which the powder participated.

EXPERIMENT XXVI.

I applied a ſtrong artificial magnet to a ſmall portion of the reſiduum pretty finely powdered; but could not perceive that it attracted even a ſingle particle of it, either before, or after laying on a red hot iron.

EXPERIMENT XXVII.

On ſix grains of the reſiduum I let fall as many drops of oil of vitriol; which inſtantly produced a violent conflict; and copious white fumes aroſe, and continued to do ſo about a minute; after which I taſted the mixture, and found that the acidity of the oil was almoſt deſtroyed.

EXPERIMENT XXVIII.

On the ſame quantity of the reſiduum as in the laſt experiment, I poured the like number of drops of ol. tart. per deliq. without producing the leaſt degree of fermentation.

EXPERIMENT XXIX.

I boiled thee drams or 180 grains of the reſiduum obtained as in the 3d experiment, in a pint and half of diſtilled water. When the indiſſoluble matter was all ſubſided, I decanted off moſt of the clear water, and put the reſt, with the ſubſidence, carefully waſhed out, into a dry paper filtre which weighed exactly 11½ grains, and as the water filtred through, I poured on more till about another pint had paſſed; then I took the filtre out of its funnel, and having carefully dried it, I found it and the contained indiſſoluble matter to weigh together 73½ grains. Deducting 11½ grains for the weight of the filtre, the remaining 62 grains is the weight of the indiſſoluble earthy matter; and this taken from 180 grains, the weight of the dry unelixated reſiduum, leaves 118 grains for the weight of the diſſolved ſalt. Now we have ſeen from the 3d experiment, that this water, after a very gentle evaporation to dryneſs, leaves 392 grains of reſiduum upon a gallon; making then due proportion, it will follow that 257 of thoſe grains are true diſſoluble ſalt, and the other 135 grains an indiſſoluble earth. And further, ſuppoſing a beer gallon of water to weigh 140½ Troy ounces, or 67440 grains, as by unqueſtionable experiments it has been found to do very nearly, then it will alſo follow, that in this experiment, the reſiduum to the exhaled aqueous part is as 1 to 171, the ſaline to the aqueous part, as 1 to 261, and the terrene to the ſame, as 1 to 497.

EXPERIMENT XXX.

A ſmall parcel of the dry reſiduum powdered per ſe, and placed on a red hot iron, laid quiet and did not ſparkle in the leaſt, nor ſent up any ſenſible ſmell or fumes, nor was at all attracted by the magnet when cold: and the like quantity mixed with as much powdered charcoal, ſhewed on the iron no mark of deflagration.

Experiments on the indoſſoluble terrene matter.

EXPERIMENT XXXI.

The earthy matter left undiſſolved in the filtre, when perfectly dry, was always of a light grey, felt harſh and ſandy, but diſcovered no grittyneſs between the teeth, nor had it any particular taſte.

EXPERIMENT XXXII.

With the ſtrong mineral acids it fermented violently and ſent up copious fumes, eſpecially with oil of vitriol; but diſcovered no commotion at all with alkalis, as ol. tart. per deliq.

EXPERIMENT XXXIII.

Being mixed with ſyrup of violets, no new colour was produced after ſeveral hours, but the next day the mixture ſhewed a dirty green.

EXPERIMENT XXXIV.

It did not ſparkle or ſwell on the red hot iron, but turned a little paler than before, without ſending up any fumes or ſmell.

EXPERIMENT XXXV.

I put half a dram of this matter into a ſmall crucible covered at top with tobacco pipe clay, leaving a little hole for a ſpiracle, and kept it half an hour red hot in a charcoal fire. When it was cool, I took out the matter, and found it united into a porous lump. It had loſt ten grains of its weight in the fire, and was whiter than before; taſted acrid and limey, but had little or no ſmell. In this condition, when powdered, it refuſed the magnet.

Experiments on the ſalt elixated from the reſiduum.

EXPERIMENT XXXVI.

I put half an ounce of the reſiduum into a filtre, and ſaved about an ounce of the firſt running of diſtilled water poured hot upon it. This ley was very clear, and of a pale yellow. It taſted much like a ſtrong brine of common ſea ſalt, but withal diſagreeably bitter.

EXPERIMENT XXXVII.

When I had evaporated the ley to dryneſs, in a china ſaucer, ſet on a hot iron plate, the remaining ſolid ſalt was pretty near of the colour of opaque amber; taſted at firſt like ſea ſalt, but left an intolerably bitter farewell on my tongue, which laſted an hour, though I waſhed and gargled my mouth with warm water. It gave nothing of a cool ſenſation, like nitre, but ſeemed rather pungent and acrid.

EXPERIMENT XXXVIII.

It turned ſyrup of violets of an elegant pale green: however, I look upon this but as a dubious proof at beſt, that the ſalt is alkaline: for mixtures of blue and yellow, 'tis well known, are generally green; and the ley produced no alteration of colour with the ſyrup. See the 25th experiment.

EXPERIMENT XXXIX.

A ſmall piece of beef rubbed over with the ſalt, after two days, redened much in boiling.

EXPERIMENT XL.

As much as would lay on a ſixpence of the ſalt, being diſſolved in a quart of warm ſoft water, hindered its lathering with good ſoap, and made a curdly mixture.

EXPERIMENT XLI.

The ſame quantity boiled with near a pint of new milk, turned it to a ſtiff curd, and a pretty clear whey.

EXPERIMENT XLII.

The ſalt wetted with a ſolution of corroſive ſublimate, ſufficient to diſſolve part of it, manifeſted no change of its colour.

EXPERIMENT XLIII.

Rubbed with an equal quantity of ſalt of tartar in an agate mortar, it betrayed little or nothing of a urinous ſcent.

EXPERIMENT XLIV.

About half a dram of the ſalt being laid on a red hot iron, neither crackled nor bliſtered, but preſently melted into water, bubled, exhaled without any notable ſcent, and yet left a ſmall matter of a white calx ſticking to the iron; which was rather of a maukiſh acrid than a ſaline taſte. The like quantity mixed in one parcel with its weight of pulveriſed charcoal, and in another of brimſtone, neither deflagrated nor fulminated on the iron.

EXPERIMENT XLV.

This ſalt fermented violently with oil of vitriol, and raiſed plenty of pungent fumes; with oil of ſulphur not ſo much; with ſpirit of marine ſalt but little; and with the weaker acids, as lemon-juice and vinegar, ſcarce at all; nor with alkalis, as ol. tart. and ſpirit of hartſhorn. A ſolution of alum in diſtilled water, dropt into the ley to a pretty good quantity, neither fermented, clouded, or precipitated any thing for ſeveral hours, but the next day the thinneſt cloud imaginable might be juſt diſcerned in the bottom of the glaſs. Aqua fortis in which it had been diſſolved, readily diſſolved leaf gold.

EXPERIMENT XLVI.

The ſalt taken dry from the fire in a china ſaucer, would always grow damp, in cool though dry air, in a few hours; and in damp weather would in a night's time be for the moſt part diſſolved to a brine: and yet it would not in any time be totally diſſolved. This brine differed not in taſte from that of common ſea ſalt; but the ſalt which would not run per deliquium, taſted extremely bitter and diſagreeable. About ten or twelve times its weight of boiling water poured on the ſalt when quite dry, would readily diſſolve it all.

Many writers on mineral waters ſpeak of obtaining the chryſtals of their ſalts as a matter of no great difficulty; nothing, according to them, being neceſſary to that end but exhaling the brine of the reſiduum till a pellicle is ſeen on its ſurface, and then ſetting it in a cool cellar for the cryſtals to ſhoot. Others, however, who ſeem to have tryed various methods, talk of the thing in a very different language. Among theſe are the laborious Dr SHORT, and the no leſs laborious Dr RUTTY. The former, in his Hiſtory of Mineral Waters, * reckons among the deſiderata for quickly diſcovering their impregnating principles, " the time and man- " ner of expeditiouſly procuring perfect cryſtals " from the ſalts of any water." And the latter has this remark, † " I made a great many fruitleſs " experiments before I ſucceeded in the cryſtali- " zation of ſalts, and at length found two things " commonly neceſſary to be attended to; 1. that " the ſolution be evaporated very low down: 2. " that the cryſtalization ſucceeded better in ſome " degree of warmth, than in the cold, even as is " known in ſugar-candy; and, accordingly, Dr " SHORT found that the ſalts of mineral waters ſhot " better in the ſummer months than in the winter." I ſhall cite one more, becauſe he is juſtly celebrated for his uncommon knowledge in practical chemiſtry and mineralogy, Dr DIEDERICK WESSEL LINDEN. § " The chief article we want in our preſent " experiments, is an immediate precipitation of the " ſalts from their watery vehicle; that is to ſay,

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* Page 316 of the firſt edition.

† Methodical Synopſis of mineral waters, Preface, pag. 12.

§ A treatiſe on the three mineral waters at Llandrindod in Radnorſhire, pag. 138.

“ to precipitate the ſalt out of its ſolvent, as ſilver “ is precipitated out of aqua fortis, by the help of “ common ſalt or copper. Whenever we attain to “ this art, we then ſhall have theſe ſalts in their ut- “ moſt perfection.——That there is ſuch a thing in “ nature, ſeems to be indicated in ſeveral inſtances ; “ for example, ſea-water will extract the ſalt out of “ ſalted fleſh. A particular ſort of clay will ſuck “ up all ſalt, and make ſalt water pure, if filtred “ or ſtrained through it. Even rock ſalt itſelf is a “ natural precipitation, cauſed by a glebe or ſtra- “ tum of this particular clay.——Why ſhould we “ not attain to this uſeful ſecret, if we did but ap- “ ply ourſelves to it?”

For my part, I muſt own, that after I had obtained a good quantity of ſalts from both theſe Bagnigge waters, I was long fruſtrated in every attempt to make them put on the appearance of cryſtals, and even began to deſpair of ſeeing them in diſtinct and ſpecific forms : but happening to look into a very entertaining as well as uſeful book, called Employment for the Microſcope, written by Mr Henry Baker, F. R. S. I there met with a moſt ingenious and elegant way of ſpeedily forming and exhibiting to view the cryſtals of ſalt floating in any pellucid ſolvent : but as this requires a microſcope of a particular conſtruction, of which I was not provided, and, beſides, ſome dexterity in managing the experiment, I had recourſe to the worthy author, taking with me a ſmall vial of the brine of either ſalt. This gentleman (I am proud thus publickly and gratefully to acknowledge it) received me with all the candour and politeneſs imaginable, immediately ſet up his microſcope, and gave me the ſatisfaction I had ſo much wiſhed for. As to the method of conducting this curious experiment, I refer

I refer my readers to the VIIth chapter of the book itſelf, and ſhall here only deſcribe the forms of the cryſtals which I ſaw in a ſingle drop of the brine of the purging water, ſpread on a tranſparent glaſs plane, placed under the microſcope after it had been a little warmed, by paſſing it a few times backwards and forwards over the flame of a candle.

As the heat firſt took effect on the thinneſt part of the drop about the verge, the exhalation was quickeſt there, and there it was that the ſcene of cryſtalization began, in the following manner.

Little ſtems without number aroſe, as it were inſenſibly (for it was impoſſible for the eye to ſeize them at their very origin) out of the liquid condenſed by the evaporation of ſome of its aqueous parts near the edge, as from a bank or bed ; and, by the like inſenſible degrees, from theſe ſhot out lateral ramifications, and others alſo from them : ſo that after ſome time, they did not ill reſemble multitudes of fern plants, with their branches and leaves. But obſerve, that by my expreſſing myſelf thus in a ſort of botanic language, I would not be underſtood to conceive any thing in theſe phænomena as analagous to vegetation, but certain configurations, as my author properly calls them, of ſaline cryſtals, reſembling the appearance of other things of a very different nature, by a certain appoſition of innumerable figures, all ſimilar to one another, or nearly ſo. For when theſe component or elementary forms, if I may ſo call them, were ſtrictly and diſtinctly viewed, they might be perceived to be in a manner all of them flat priſms with triangular baſes, not at right angles, but ſlanting to their ſides, ſuch being the ſpecific form the cryſtals of that particular ſalt did then, and at all times does aſſume ; for ſalts, as the great Sir Isaac Newton ſuggeſts, being in a great meaſure indeſtructible in their nature, their ſhapes are alſo conſtant and invariable.

Upon ſhifting the glaſs, ſo that a part of this little briny ocean remote from the ſhore, came in ſight, the appearance was greatly altered: for now every where were ſeen little ſix-ſided figures, infinite in number, if I may ſay ſo, in reſpect of the numberleſs priſms before ſpoken of; ſome of theſe perfect cubes, others conſiſting of two equal and rhombal faces, with four equal ſquare ſides, ſome ſo very minute as hardly to be diſtinguiſhed at firſt from points, but ſenſibly increaſing their bulk whilſt they were looked at. There was yet another ſort, being four-ſided flattiſh pyramids, with a narrow rhombal baſe; but theſe were feweſt of all. In ſome places, many of one or more ſorts were joined in contact, and lay in cluſters or groupes; and wherever this happened, they were hardly any of them perfect in their figure.

Thus agreeably was I entertained for an hour or more: but this rather increaſed than abated my impatience of falling to work again, in hopes of getting cryſtals of far ampler dimenſions than thoſe I had ſeen, the largeſt being ſcarce $\frac{1}{400}$ of an inch long; and, after a while, by a due attention to Dr Rutty's hints, and others I chanced to furniſh myſelf with from a very curious paper in the Pariſian Memoires *, and a world of tryals, I at laſt gained my end, but not without making uſe of a great quantity of ley at a time, ſo that it will be hardly worth my while to go into a detail of my experiments, or my readers to repeat them af-

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* For the year 1745, entitled, *Sur la Cryſtalliſation du ſel marin*, par M. Rouelle.

ter me: however, let me obſerve, that the cryſtals were of the forms already deſcribed, and no others, as far as I could perceive.

I have ſaid, Experiment II. that when the magma began to ſtiffen, after the evaporation was almoſt compleated, it was very apt to ſtick faſt to the veſſel. This I found to be from a clammineſs in the ſalt which it would never part with whilſt over the fire; but as ſoon as taken off it might, for a little while, be kneaded like dough, without adhering to the fingers, and in a few minutes, by growing cooler, would harden, and might then be eaſily pulveriſed. This clammy part, ſomewhat analogous to heated alum, would diſſolve in water, and paſs the filtre with the reſt, and might be ſeen after ſome days ſtanding ſtill, in the form of a cloud at the bottom of the ley. This ſubſtance I ſuſpected to be a great impediment to the ſhooting of the cryſtals of this water's ſalt; for the chalybeat's ſalt has leſs of it. At laſt I bethought myſelf of a probable means either of diſſolving or diſengaging it; with which, therefore, I will conclude my experiments on the purging water.

EXPERIMENT XLVII.

Into a clear cylindrical glaſs, which held about three ounces of the ley of a moderate ſtrength, ſoon after it had paſſed the filtre, and before any cloudineſs had ſubſided, I dropped four drops of ſolution of ſalt of tartar, made with juſt as much water as would entirely diſſolve it at once; which diffuſed itſelf in a light coloured cloudineſs all over the ley, and did not ſeem to think much before it grew dark. The next morning I found it was all got to the bottom, and condenſed there in a kind of curd, of the thickneſs of a crown-piece, having left the ley very clear, and of a much lighter yellow than it had upon paſſing the filtre. But how was I delighted when I ſaw the glaſs lined all over with beautiful cryſtals big enough to be ſeen diſtinctly without magnifying glaſſes! In a few hours more the card relented, vaniſhed, and diſcovered more cryſtals, which almoſt covered the bottom. I tried over the experiment, with ol. tart. per deliq. and then with ſpirit of hartſhorn and ſpirit of ſalt ammoniac: they all produced cryſtals, and all of the ſame ſort, namely the priſmatic ones; but none did it ſo well as the ſolution of ſalt of tartar. I therefore, by way of aiming at improvement, put in twice the formerly quantity of it, and ſhook the mixture ſmartly for a quarter of an hour: the conſequence was, that all the next day I ſaw a thick curdy cloud at the bottom, the ley not over clear above it, and not a ſingle cryſtal; the day after, upon looking narrowly, I diſcovered one or two, but pitifully ſmall; ſo here I reſted.

It may now be aſked, Were not theſe cryſtals formed out of the liquors dropt in, and not from the ley?

I anſwer, 1. It is highly improbable that cryſtals of the ſame form ſhould ariſe out of ſo many different liquors. 2. It is altogether as unlikely, that ſalts, ſo very apt to colliqueſce of themſelves, ſhould chryſtalize in ſo unconcentrated a ley. 3. Neither the chryſtals of tartar, nor of hartſhorn, nor of ſalt ammoniac, at leaſt none that I have ſeen, bear any reſemblance of theſe. 4. Which I think muſt put the matter beyond all uncertainty, the bulk of the cryſtals taken together, when the tartar ſolution was uſed, was at leaſt twenty times as much as the liquors dropped in. 5. I may add, that the ſhape of the cryſtals being the ſame as of thoſe Mr **Baker** ſhewed me, is the ſtrongeſt proof that they aroſe out of the ſame ley.

If it ſhould be demanded, why cryſtals of the other figures, before deſcribed, were not alſo formed?

My opinion is, that it was becauſe the ley was with reſpect to them, too weak; for having poured it off from the cryſtals, and exhaled it to the appearance of the pellicle, the other ſorts were found formed the next day but one, without any priſmatic ſhape. Theſe laſt cryſtals being ſeparated with a penknife, and laid to drain on ſpongy paper, taſted exactly like common ſalt, whereas the priſmatic cryſtals were very bitter.

Obſervations on the Experiments.

It is not, I think, to be denied, that we have materials before us more than ſufficient to inform us of the ſeveral contents or component parts of this purging water.

In the firſt place then, a pure elementary water is ſelf-evident, did not the firſt experiment prove it, and makes by many times the greateſt part of the whole.

No leſs is a conſiderable portion of elaſtic air; but whether of the ſame nature, or ſubject to the ſame laws as the atmoſpheric air that ſurrounds us, is not by far ſo manifeſt; and to ſettle that point would perhaps require a ſeries of experiments of a very different kind from any of the foregoing.

The 1ſt, 2d, and 3d experiments directly prove the exiſtence of an earthy matter in the water, and the 30th experiment ſhews it to be about $\frac{51}{00}$ of the whole. The 6th, 7th, 11th, 12th, 14th, 15th, 16th, 17th, 20th, 27th, 29th, 32d, and 33d experiments indicate this earth to be calcarious, abſorbent and alkaline; the 37th experiment ſhews it to be of a-kin to lime-ſtone; and, laſtly, the 18th, 26th, 30th and 35th experiments imply that it holds nothing of iron.

That this water is impregnated with ſalt, the taſte of the reſiduum in the 23d experiment plainly demonſtrates, as alſo does the 29th experiment; from whence too we learn, that ſuch ſalt is about $\frac{1}{260}$ of the whole: that one part of it is ſal gemm, the ſame as ſea ſalt, the taſte alone would be ſufficient evidence, were it not corroborated by the 11th, 12th, 24th, 27th, 36th, 46th, and 47th experiments; and that another part of the ſame ſalt is bitter, is proved ſufficiently from its taſte, in the 23d, 36th, 40th, 46th and 47th experiments; that it is alſo purgative its effects demonſtrate. It ſeems moreover from many ſymptoms to be far from acid, and of a neutral kind rather than alkaline; but that it has any affinity to nitre, there are but two experiments, namely the 29th and the 39th, to imply it; and that from its turning fleſh red, which other ſalts, as bay ſalt, are known likewiſe to do. Beſides, it cannot be made to fulminate, and its cryſtals, as deſcribed at the cloſe of theſe experiments, are ſo widely different from thoſe of either true nitre, or of Dr Lister's mural nitre, precariouſly aſſerted by ſome to be the univerſal impregnator of bitter purging waters, that I ſhall not ſcruple to pronounce it a ſalt of a particular kind. What proportion theſe two ſalts bear to one another is uncertain.

Of the medicinal Virtues of the purging Water, and the right way of uſing it.

The ſum of our inferences reſolves this water into,

1. The pure aqueous element.
2. An elaſtic air.
3. A calcarious, abſorbent, alkaline earth, ſomewhat of the nature of lime-ſtone.
4. A muriatic ſalt; and,
5. Another bitter and neutral ſalt, of a diſtinct kind, in which the purgative quality of the water chiefly, if not wholly conſiſts.

This water purges in leſs quantity than perhaps any other known in England, or elſewhere, three half pint glaſſes ſufficing for a doſe in moſt conſtitutions, without the aſſiſtance of artificial ſalts ſo frequently brought in to help the operation of weak waters, which muſt otherwiſe be drank in nauſeating quantities to produce the expected effect.

It has been remarked, that when a bitter purging ſalt is blended in a water with a plentiful quantity of a muriatic one, as is the caſe here, ſuch fails not to purge in an eaſy placid manner, without griping, ſickening, or ſinking the ſpirits, but, on the contrary, remarkably raiſing them, and exciting the appetite to food, even in the operation; all which is found remarkably verified by the effects of this water.

And whereas it is no uncommon thing for a purging water to heat the rectum, and render the parts about it intolerably ſore, and bring on the he-

hemorrhoids, a frequent objection to drinking the *Acton* waters, and ſome others near London; this water has been found beneficial in the laſt mentioned complaint, and beſides experienced to be very diuretic, and happily adapted to waſh and cool the kidneys, and other urinary ducts, diſcharging gravel, ſtones, and ſabulous lodgments, with ſuepriſing power and eaſe.

It is well known that perſons of hypocondriac and ſcorbutic habits are too apt to be ruffled by ſtrong cathartics; for ſuch then this water proves a moſt commodious purge, as its operation is mild, certain. and expeditious, without agitating the blood, or fermenting the humours.

In ſmaller doſes it acts as an alterative, by which way of adminiſtering it ſurpriſing advantage has been gained in ſcorbutic and ſcrophulous diſorders, of many years ſtanding.

In plethoras and infarctions from phlegmatic humours it gives great relief, as it evacuates without commotion.

Baccius reckons ſuch waters excellent in external application, being poſſeſſed of a bracing or ſtyptic quality, whereby they ſtrengthen the eyes, reſtrain ſpontaneous tears, and remove inflammations; nor for the ſame reaſon are they leſs ſerviceable to the mouth and gums, faſtening looſe teeth, healing eroſions of the lips, and reſtraining defluxions of hot humours.

In diſorders of the primæ viæ this purging water has been found very beneficial, and capable of conquering habitual coſtiveneſs, cholics, and the iliac ſion, being drank warm going to bed.

It dilutes, deterges, and eliminates out of the habit all acidities and corrupt humours of the inteſtines, removes crude eructations and tenſive inflations of the ſtomach, and while it evacuates, at the ſame time ſtrengthens, reſtoring loſt appetite and digeſtion; ſtops vomiting and retching, and cures heart burn, and cholicky diſorders, anxieties, pains of the head, fluſhings, tremors and palpitations, ſwimmings and giddineſs.

It is a powerful anthelmintic, and infallibly ſcowers away the ſlimy viſcid humours in which worms lodge, and nouriſh their brood.

In ſuppreſſed menſes it is aptly ordered to prepare the way for emenagogues, by properly cleanſing and ſtrengthening the alimentary tube, and diſpoſing it to propel thoſe active medicines through the lacteal veſſels, ſo as to perform the part allotted to them in the road of circulation. It is extremely beneficial in the troubleſome fluſhings apt to attend the ſex upon the ceſſation of the catamænia, from a redundance of blood, which alſo brings on flatulencies and tumors of the lower parts.

In the irregular gout, Dr MUSGRAVE, who wrote profeſſedly and with great judgment on that diſtreſsful complaint, beſtows the higheſt encomiums on purging mineral waters; and in the athritic colic he adviſes that they ſhould be joined with chalybeats.

In incipient cancers a better medicine is not known for effectually putting a ſtop to thoſe terrible pains, which often dart into the nipple, and the parts about it; and to oppoſe the progreſs of this otherwiſe fatal diſeaſe, if it be drank with continuance at proper intervals, and iſſues be opened.

Pimples and heats in the face, and other parts, are happily cured by drinking this water; and a return of them prevented by continuing the courſe through a ſecond ſeaſon, and in a herpes, though ever ſo obſtinate, it is as it were a ſpecific, and preferable to any thing in the whole materia medica.

Previous to inoculation for the ſmall-pox, it has been found a very proper purge; and for diſcharging the relicks out of the blood, at the end of the diſtemper; for which purpoſes, I am informed, it is uſed with great ſucceſs at the ſmall-pox hoſpital.

Rules to be obſerved in drinking this Water.

As a purge, it may be drank ſix or eight days, to three or four glaſſes each morning, as it is found to operate; ſtopping a day or two, about the middle of the courſe: but if taken as an alterative, a glaſs or two every day is enough, and it ſhould be continued through one whole ſeaſon at the leaſt.

If the water be found to diſagree with delicate conſtitutions cold, it may be warmed without any detriment to its purgative virtue; or if taken cold, it may be reconciled to weak ſtomachs by chewing and ſwallowing a few caraway-ſeeds: it may alſo, as an alterative, be mixed cold or warm with whey.

Laſtly, whether it be uſed as a purge or an alterative, it will not be proper to take any breakfaſt but what is liquid and diluting, as tea, weak broths, &c.

I ſay nothing of the expediency of gentle exerciſe during its operation, that being eaſy to be underſtood.

PART II.

Of the Bagnigge Chalybeat Water.

IN the year 1757, the ſpot of ground in which this well is ſunk, was let out to a gentleman curious in gardening; who obſerved that the oftener he watered his flowers from it, the worſe they throve: I happening towards the end of that ſummer to be in company with a friend or two who made a tranſient viſit to Mr HUGHES, was aſked to taſte the water; and being ſurpriſed to find its flavour ſo near that of the beſt German chalybeats, did not heſitate to declare my opinion, that it might be made of great benefit both to the public and himſelf. At my requeſt, he ſent me ſome of the water, in a large ſtone bottle, well corked, the next day; a gallon whereof I immediately ſet over the fire, and by a haſty evaporation found it very rich in mineral contents, though much leſs ſo than I afterwards experienced it to be when more leiſurely exhaled by a gentle heat. Whilſt this operation was carrying on, I made ſome experiments on the remainder of the water, particularly with powdered galls, which I found to give in leſs than a minute, a very rich and deep purple tincture to it, that laſted many days without any great alteration. I reported theſe matters to Mr HUGHES, but ſoon after, a very dangerous fit of ſickneſs put a ſtop to my experiments, which I reſumed not that year, nor till lately, when the proprietor called, and told me his waters were got into very great vogue, and known by the name of BAGNIGGE WELLS, which indeed I remembered to have ſeen in the news-papers, without

out ſo much as gueſſing it had been given to theſe ſprings. Mr Hughes took me to his wells, where I was not a little pleaſed with the elegant accommodations he had provided for company, in ſo ſhort a time. Upon intimating his deſire that I would proceed to compleat a proper ſeries of experiments on the waters, and draw up ſome rational account of them, I conſented to do ſo; the reſult of all which is the little treatiſe now humbly ſubmitted to the public.

The chalybeat well is juſt behind the pump room, about forty yards ſouth of the purging well, being almoſt twenty feet deep, and near two yards in diameter within the ſteaning. It is fed by no leſs than four ſprings drilling thro' the ſteaning, the ſtrongeſt and pureſt of which is one that runs in plentifully from the north. It has been found upon exhauſting this well, that it repleniſhes at the rate of three feet in an hour.

The water freſh pumped up, is exceeding clear, and much of the complexion of pure rain water; has ſomething of a ſulphury ſmell as it iſſues out, and diſcharges great quantities of air-bubbles at the ſurface. Its taſte is highly ferrugineous, with an agreeable and ſprightly ſubacid tartneſs.

To thoſe that have not been uſed to it, it is apt to communicate a kind of giddineſs, with an amazing flow of ſpirits, and afterwards a propenſity to ſleep, if exerciſe be not interpoſed.

Being left open to the air, it will in an hour or leſs turn a little wheyiſh, and abate of its clearneſs, eſpecially in warm weather; and perhaps in a day or two begin to let fall an ochrey ſediment: this is common to all chalybeat waters.

If it ſtands quiet in an open veſſel, a ſhining ſcaly duſt ſpontaneouſly emerges and covers the ſurface; but if diſturbed, it ſinks to the bottom, and there lies undiſſolved, with the ochrey ſediment, and will riſe no more. This ſubſtance, upon examination, proves to be ſelenite.

I have obſerved already, page 5, that the thermometer in this water always ſtands 10 or 12 degrees higher than in the purging water; whence I think I may infer, that it is poſſeſſed of a thermal warmth, probably from the mutual action of its iron and ſulphur upon each other; I ſhall bring ſome proofs that this is the caſe.

By the hydrometer, the ſpecific gravity of diſtilled water to that of this chalybeat, under the ſame temperature, come out as 1 to 1,0042.

It retains its mineral virtue to a moſt amazing degree, in all ſeaſons and climates; and in clean bottles well corked and waxed, will bear carriage, not only to any part of Great Britain, and Ireland, but even beyond ſea, as far as the Weſt Indies, and back again; of which more hereafter.

Experiments on the Chalybeat Water, in order to a diſcovery of its principles and contents.

EXPERIMENT I.

Two drops of tincture of galls, made by pouring a pint of pure rain water boiling hot on half an ounce of the nuts in powder, let fall into half a pint of the freſh chalybeat, formed a little browniſh cloud without the leaſt redneſs, near the ſurface, which gradually ſunk with a curling motion, turned by degrees to a rich tranſparent and deep purple, and tinged the whole body of the water of the ſame colour, which laſted without any ſenſible change ſeveral days.

EXPERIMENT II.

The like quantity of the chalybeat placed in the receiver of an air-pump, as ſoon as the pump was worked, parted with innumerable air-bubbles, and continued to do ſo for above 300 ſtrokes of the piſton. When the gauge ſhewed the pump to have been well exhauſted, the water was taken out, and found to taſte dead and vapid, but ſtruck the purple with the galls as readily and fully as before, and retained it as long. The experiment with galls was repeated with water that had been kept in the exhauſted receiver four days, with the like ſucceſs.

EXPERIMENT III.

Mr HUGHES fetched a bottle of the chalybeat, which had remained uncorked in the pump room above a week; a glaſs of it tinged with the galls as readily as if freſh from the pump. Another bottle that had been kept corked under water five months, did the ſame.

EXPERIMENT IV.

I ordered an eight gallon jarr, whoſe mouth was about 9 inches diameter, to be filled with the chalybeat, and ſet in the pump room uncovered, in order to promote the ſeparation and ſubſiding of its ochre, which I was willing to collect in a good quantity for making experiments upon it. This was in Auguſt 1759. At the end of three weeks the weather continuing pretty warm, the water was poured out, and ſmelt very fœtid, yet was clear and taſted ſweet, ſprightly, and ſtrong of iron; wherefore, being deſirous of trying the effect of the gall tincture, I poured a ſingle drop into a glaſs of it, and was ſurpriſed to ſee that it preſently gave the purple as deep or rather deeper than when freſh from the fountain. I then proceeded to examine the contents of the bottom of the jar; and, contrary to my expectation, found there leſs ſediment than is often met with from a ſingle quart of the ſame water after a few days ſtanding. What grout I could collect I poured into a bottle, with as much of the water as filled it. This I ſent home careleſly corked, having firſt ſlip'd a ſilver groat into it to try if it would be diſcoloured. Two days after I found that the water was got quite clear, and I could perceive the groat among the ſediment, tinged of a duſky yellow. I poured out a glaſs of the water, which ſtill ſtank, but taſted ſweet, and again ſtruck with a drop of the tincture a fine pink colour, which in a minute turned of a deep purple; thus I went on, day after day, entertaining myſelf and my friends with this uncommon phenomenon, till my bottle was exhauſted.

A little reflection made me conclude, that all this might be the effect of a certain power in the water, of reſorbing, rediſſolving, and once more intimately reuniting with its depoſited ochre and iron, by a ſulphury gas which I plainly ſmelt, ſo as to recover its martial taſte and virtue, together with the imaginary tinging principle, or volatile fugacious ſpirit, ſo generally ſupppoſed to eſcape even glaſs with eaſe, and not to be renewed. Should this be the caſe, thought I, why may not the ſame power ſupport it through a long voyage? and I propoſed to Mr Hughes to ſend a ſtone bottle of the chalybeat by ſea to Briſtol, to be brought back by the ſame ſhip. He anſwered that he believed my curioſity might be otherwiſe ſoon ſatisfied, for that he had the laſt year ſent ſome bottles with the like intention to Virginia, and expected the return of them in a ſhort time.

Ex-

EXPERIMENT V.

In October Mr HUGHES came to let me know the bottles were come back, which he had ſent juſt a year before; and the next day one of each ſort was brought me. I have before, page 6th, ſpoken of the condition in which I found the purging water. We opened the chalybeat and taſted it: I cannot ſay that it had preſerved its full flavour; yet it tinged well with the galls, which it did alſo, tho' not ſo readily, a day or two after, when the bottle had been left but in part full.

EXPERIMENT VI.

Among the hiſtories of chalybeat waters we frequently find a very ſmall degree of heat above that we underſtand by temperate, will ſoon deprive moſt of them of the faculty of ſtriking purple with galls, which has been commonly aſcribed to the eſcape of the ethereal principle or mineral ſpirit, as it is called, in which the ſaid faculty, and all their medicinal virtues are held to conſiſt. Some indeed are ſaid to retain them more powerfully, as that of Pyrmont; and among our Engliſh waters the Malton ſpaw, which will bear tranſporting with its virtues entire, ſays Dr. RUTTY, to foreign parts. I was willing to ſatisfy myſelf by experiment, what heat this chalybeat would endure before it gave over tinging; I therefore ſet a tin quart pot full of it, together with a ſmall FAHRENHEIT's thermometer, upon charcoal embers. When the quickſilver had got up to 96, the term of animal heat, I poured out a glaſs, which had all the genuine flavour, taſted very agreeably, and ſtruck the purple as well as when cold: it did it as well too, I thought, at 112, and 120; but at 130 it began to let fall its ochre, and tinged but ſlowly and faintly; at 135 it gave no colour at all.

EXPERIMENT VII.

The reverend Dr. **Hales** * is of opinion, that "the ſtrength and goodneſs of a chalybeat cannot "be judged altogether by the deepneſs of its tinc-"ture with galls, as ſome have imagined; and that "it ſeems reaſonable, in order to judge of the "comparative ſtrength of chalybeats, not only to "compare the different ſtrength of their tinctures, "but alſo their reſpective quantity of reſiduums, and "how much of a mineral acid, as oil of ſulpher, is "required to take away their tinging quality." Thus Bath water ceaſed to tinge with four drops to a pint, Bramſhot with three, and Sunning-hill with a ſingle drop. I tried the effect of the ſame acid on Bagnigge chalybeat: With five drops to a pint I perceived no alteration; with ten not much; with twenty the galls gave a fine pink colour, which grew more and more dilute as I increaſed the number of acid drops in each pint glaſs of the water, but was not entirely extinct with fifty drops; and the addition of a drop or two of oil of tartar would preſently again produce the deep purple.

EXPERIMENT VIII.

To the mouth of a two quart bottle juſt filled with the chalybeat brought freſh from the pump, we fixed a ſmall ſuction ſyringe with its piſton thruſt down cloſe to the bottom; which as ſoon as we had made all ſecure with a good cement, we drew up to the top and ſo left it for about two hours, to receive the air and the elaſtic ſpirit, if any, that might extricate itſelf from the water; then we cloſed the turn-cock at the neck to prevent any thing from eſcaping from within, and having taken off the ſyringe we inſtantly immerged its ſnout into a ſmall baſin of rain water, with which a tea ſpoonful of tincture of galls had been mixt, opened the ſtop-cock and forced out the air into the water, which immediately emerged in bubbles at the ſurface; but as for a tinging ſpirit, we could diſcern no tokens of any ſuch thing, for the water continued as colourleſs as before.

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* Account of ſome experiments and obſervations on chalybeat waters, pag. 145.

The foregoing experiment was tried in conſequence of one ſaid to have been made by Dr. TAVERNER on the Witham ſpaw, which I carefully repeated with this chalybeat, but without any ſucceſs. Dr. RUTTY calls it a curious one, and recites it thus:*

" Two Florence flaſks were filled, one with the " ſpaw freſh taken up, the other with common wa- " ter in which was a ſtrong infuſion of galls, and by " means of a ſiphon a communication was maintain- " ed between both: the mouths of both were ac- " curately cloſed with a cement that would prevent " the moſt ſubtile vapour from eſcaping. Where- " upon the mineral ſpirit paſſing through the ſiphon " did tinge the water with purpliſh ſtreaks."

Quere. Might not that leg of the ſiphon which was immerged in the common water, have been, by ſome unheeded accident, wetted with the chalybeat, or the moiſt vapour of it?

EXPERIMENT IX.

The chalybeat, when evaporated in balneo vaporis, always left a ſmall matter more of dry reſiduum in ſummer than in winter, which was of a deep yellow approaching to an orange colour, with a few glittering particles interſperſed. A gallon left upon a medium 243 grains, 125 of which upon filtration with diſtilled water, proved to be diſſoluble ſalt; the reſt an ochrey earth with a ſmall portion of ſelenite.

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* Synopſis, pag. 385.

EXPERIMENT X.

The chalybeat with ſyrup of violets turned of a light weak green, which in a little time faded quite away. With the ſame ſyrup diluted in water no colour was produced.

EXPERIMENT XI.

With powdered rhubarb it firſt took a brown, afterwards a purple brown.

EXPERIMENT XII.

A pound of beef ſoaked three days and then boiled in it, was a little redened, but far leſs than with the purging water.

EXPERIMENT XIII.

Ol. tart. ſunk quick and formed a ſmooth white ſediment: ſpirit of hartſhorn gave a ſemi-tranſparent whiteneſs, ſlow in ſubſiding; ſpirit of ſalt ammoniac did much the ſame.

EXPERIMENT XIV.

A ſolution of borax in water, ſtruck a very faint white cloudineſs which vaniſhed without precipitating: A ſolution of alum gave an equally diffuſed pearlineſs or opaline for a conſiderable time, which at the end of three hours ſettled in an uniform ſediment without curdling, and the next day had the appearance of a fine light-coloured powder.

EXPERIMENT XV.

An aqueous ſolution of ſugar of lead inſtantly ſtruck a very thick and ſnow-white turbidneſs which did not begin to ſink for ſome time, but at laſt ſubſided in a kind of white cloud, which gradually took the appearance of a ſubtile powder of the ſame colour, but very ſmall in quantity.

EXPERIMENT XVI.

Two drops of a ſaturated ſolution of cupelled ſilver in aqua fortis, let fall upon three ounces of the chalybeat, inſtantly generated a pearly cloud, which in diffuſing itſelf inclined to a pink colour, ſettled down purple, and the next day was dyed on its top ſurface of a very deep and dark purple, which held the ſame many weeks. The like ſolution of quickſilver produced as ſuddenly a cream coloured cloud, from whence fell, firſt a yellow precipitate paler than turpethum minerale, and then upon that a white one, both permanent for ſeveral days.

EXPERIMENT XVII.

A few drops of concentrated oil of vitriol excited a quick ebullition and efferveſcence with one ounce of the chalybeat, and the inſtillation being continued till the quantity of the acid was almoſt equal to that of the water, the mixture became ſo hot that it broke the glaſs to pieces. The like experiment being made with ſtrong ſpirit of marine ſalt, a ſudden ebullition enſued and a cloud of pungent white fumes aſcended, but the effervefcence was fcarce fenfible. Oil of fulphur, the elixir acidum and lemon juice, likewife raifed fome ebullition, but not a great deal.

EXPERIMENT XVIII.

This water curdled with foap, but in a far lefs degree than the purging water, and fcarce at all with hot milk.

Experiments on the refiduum of the chalybeat water.

EXPERIMENT XIX.

It tafted at firft like that of the purging water, that is of fea falt; afterwards bitterifh, but not fo difagreeable as the other. Nor did the fame quantity of it curdle fo much with foap, nor redden flefh as that did. It relented much flower in the fame moift air, and not half fo much of it was diffolved in any fpace of time.

EXPERIMENT XX.

When rubbed with fyrup of violets it gave a faint yellow green, if the mixture was fpread on white paper; any pulverable fubftance of fo deep a yellow 'tis like would have produced fuch a colour.

EXPERIMENT XXI.

It difperfed no remarkable fcent when triturated either with falt ammoniac, or falt of tartar.

EXPE-

EXPERIMENT XXII.

The ſtrong mineral acids excited a violent commotion with the reſiduum, and raiſed plentiful white fumes. Alkali's did not ſeem to operate upon it.

EXPERIMENT XXIII.

I could not find any particle of the reſiduum to leap or adhere to the magnet. When laid on a red hot iron it neither ſmoaked, ſparkled nor bliſtered, but crackled a little, and turned or curled up at the edges: the under part next the iron was changed to a tawney red, and many particles of that colour were attracted by the magnet. Another parcel mixt with powdered charcoal was laid on, which alſo crackled faintly, but without any deflagration.

Experiments on the indiſſoluble matter.

EXPERIMENT XXIV.

The indiſſoluble matter left in the filtre when dried, was of a light brick colour with a ſhade of the orange; taſteleſs and not gritty, yet of not ſo ſubtile particles as the earthy matter of the purging water; it fermented and fumed much with the ſtrong acids, which diſſolved a great part of it, but lay quiet with alkali's.

EXPERIMENT XXV.

Having been rubbed with ſyrup of violets no new colour was produced till the next day, when the mixture was changed to a brown bordering upon green.

EXPERIMENT XXVI.

It laid quite ſtill on the hot iron, and turned of a brown like ſpaniſh ſnuff. Half a dram of it roaſted half an hour in a crucible in a clear charcoal fire loſt 12½ grains of its weight, and looked of a tawney fleſh colour. It had when taken from the fire a ſtrong ſulphurine limey taſte, and ſeemed to burn my tongue; I had afterwards ſeveral ſulphury belches, probably from ſwallowing my ſpittle. The hot limey taſte vaniſhed from it entirely in a few days, though it retained the ſulphury flavour. When thus roaſted, the magnet would attract it as readily as the filings of iron.

Experiments on the elixated ſalt.

EXPERIMENT XXVII.

The ſalt was of an orange colour, and taſted like ſea ſalt with a bitteriſh farewell, but not ſo bitter or ill reliſhed by a great deal as the purgative ſalt. It imbibed the moiſture of the air, yet not quite ſo much as the other; and required five or ſix times its weight of water to diſſolve it entirely, being dry.

EXPERIMENT XXVIII.

The ſtrong mineral acids excited a violent commotion and fumes with it; alkali's none at all. It ſmelt no ways urinous rubbed with ſalt of tartar; nor altered its colour with an aqueous ſolution of ſublimate.

EXPERIMENT XXIX.

It turned ſyrup of violets greeniſh; ſo did its ſtrong brine: but it ſhould be noted that both were of a deep yellow colour.

EXPERIMENT XXX.

Lean beef powdered with it two days, and then boiled, had but a ſlight caſt of red.

EXPERIMENT XXXI.

Half a dram of it diſſolved in a quart of warm water, rendered it very reluctant to lather with ſoap. The like quantity turned new milk a little grumous.

EXPERIMENT XXXII.

In the preparation of the Pruſſian blue, it is generally held that the iron contained in the vitriol is the baſis of the fine colour produced; and I having ſome ſuſpicion that the deep yellow colour of this ſalt was owing to a ſubtilely attenuated iron that paſſed the filtre along with it, employed it as a ſuccedaneum to the vitriol, in the proceſs; and thereby obtained a blue pigment, but very pale and inelegant.

EXPERIMENT XXXIII.

The cryſtals formed in a drop of the ſtrong brine of this ſalt, placed under the microſcope, had none of thoſe branchy configurations deſcribed in page 22, nor could I perceive a double pyramidal cryſtal, or one with oppoſite rhombal faces among them: and whether ſeen by the microſcope, or by the bare eye, when made to ſhoot by means of the ſalt or tartar, they were all either cubes or flat triangular priſms; yet certainly the number of the priſmatic ones was very ſmall in compariſon of what the other ſalt afforded, and the cubes, on the contrary, ſeemed to be multiplied.

Obſervations on the Experiments.

Without going into a particular comment upon each experiment, it will appear by comparing this ſet with the former, that though theſe two waters differ widely as to ſome of their reſpective principles and component parts, yet they agree pretty well in others, proportions only excepted; and no wonder, conſidering their fountains happen to be ſituated ſo near together.

The water, regarded as pure and elemental, muſt be the ſame in both; ſo in all probability is the elaſtic air they contain; each holds a muriatic and a bitter purgative neutral ſalt, each an alkaline abſorbent or lime-ſtone earth.

But the water we have at preſent under conſideration, appears from many circumſtances to be alſo richly impregnated with a chalybeat principle, moſt exquiſitely refined and elaborated by nature, and adapted to penetrate the minuteſt veſſels and receſſes of the human frame, and thereby correct, reform, invigorate, and confirm the conſtitution.

To prove what we aſſert, let us compare it with the moſt celebrated of all chalybeats, the Pyrmont water. That it is ſaid, ſtrikes a deep purple with galls, bears carriage well, and will tinge at a year old: we have proved that this does the ſame, ſee Experiment 5th. Dr Hales conjectures that the goodneſs of a chalybeat may be judged of from the quantity of its reſiduum,

ſiduum, and is apt to think that the excellency of the Pyrmont lies chiefly in that. Dr RUTTY is of the ſame mind, and ſets down in his ſynoptic table the quantity to be 145 grains upon a gallon; to the Pouhon only 40; and among 69 more Engliſh and Iriſh chalybeats, there is but one whoſe reſiduum exceeds 40 grains upon a gallon. Turn to our 9th experiment, and it will appear, that the Bagnigge chalybeat leaves no leſs than 243 grains on a medium, almoſt twice as much as the Pyrmont, half of which is an earth, rich in a moſt ſubtilely attenuated iron. How long the Pyrmont will retain its flavour, virtue, and tinging faculty in open jars, bottles, or in vacuo, or what degree of heat it will endure before it ceaſes to tinge, or begins to drop its ochre, has not been made appear that I know of; all which the reader may be ſatisfied about, as to the Bagnigge water, by reading our 2d, 3d, 4th, and 6th experiments.* That

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1. Being poured into a glaſs, it ſparkled little more than the Bagnigge chalybeat did from a bottle that had been kept five months.

2. It ſhewed no purple with tincture of galls, even with ten drops to half a pint, but only a pale pink colour which deepened not on ſtanding; but the like quantity of the Bagnigge water, five months old, preſently turned of a deep purple, with a ſingle drop.

3. To my palate it plainly taſted of the vitriolic acid, and the reſt of the company thought ſo too; I therefore dropp'd a ſingle drop of ol tart. per deliq. into the glaſs with the tincture of galls, to correct the acidity, and the whole, upon ſtirring it, inſtantly changed to a full purple, ſee Experiment 7. This confirmed my ſuſpi-

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That the chalybeat principle not only abounds in this water, but is beſides ſo very refined and delicate as to paſs the filtre along with the ſalt, and be intimately combined with it, in the manner of a martial vitriol, is, I humbly apprehend, ſet above a bare conjecture, by the laſt experiment but one.

And I propoſe it to the conſideration of thoſe who are better verſed in theoretic and practical chemiſtry than I pretend to be, whether from the ſcent of the water flowing from the pump, from its turning the precipitate pure ſilver of a blackiſh purple, and tinging ſilver infuſed in it always yellow, but much more ſo when it affords evident marks of putreſcence, whether, I ſay, it has not a principle of ſulphur in its compoſition, the acid of which let looſe when it begins to putrify, diſſolves the ſeparated martial ochre, and renders it fit to be taken up again into the aqueous fluid? And, whether that which is commonly underſtood by the terms, ethereal fugitive ſpirit, ſpiritus rector mineralis, &c. ſhould be admitted as

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ſuſpicion that it had been prevented from growing vapid by the addition of an acid, and made me recollect that Mr Reynolds is very clear, that ſo volatile a water as the Pyrmont is reckoned to be, cannot retain its tinging faculty, even for a few days. but by mixing acids with it; and he appears to confirm what he advances by ſtrong arguments. See his ſenſible treatiſe on the Bromley chalybeat, pag. 26, 27, 28. And Dr Hales's Experiments and Obſervations, pag. 124, tells us, that the Pyrmont waters often here have ſeemed very briſk from their briſk air, yet would give no tincture with galls, nor was any benefit found from drinking them.

4. After a very gentle operation in balneo vaporis, I had 32½ grains of reſiduum from a quart of this Pyrmont water, or 158 grains on a gallon, being ſomewhat more than what Dr Rutty ſtates: of thoſe 39½ grains, 22 were an impalpaple calcarious earth, of the colour of rotten-ſtone, and 17½ a diſſoluble bitter ſalt. Dr Seip found 22 grains of calcarious matter in a pound of the water, 7 of which were a bitter ſalt.

a component principle of chalybeat waters; or conſidered only as a mode of acting of certain real principles upon one another?

Upon the whole, then, I think I may conclude from this ſecond ſeries of experiments, that the component parts of the Bagnigge chalybeat, are,

1. A pure elemental water.
2. An elaſtic air.
3. A calcarious abſorbent lime-ſtony earth.
4. A ſmall portion of ſelenite.
5. An ochreous earth.
6. A highly attenuated iron.
7. A muriatic ſalt.
8. A little bitter neutral ſalt.
9. And probably an active ſulphur.

Of the medicinal virtues of the chalybeat water, with directions for uſing it.

Although experience abundantly proves, that the operation of chalybeat waters in general, as evacuants, is by urine; yet it is as conſtantly obſerved, that they are apt to prove a little purgative at firſt drinking of them, eſpecially if they happen to have any thing of a bitter ſalt in them, as this of Bagnigge very evidently has; whence three or four glaſſes of it are apt to take downward at the firſt ſetting out; but this effect ſeldom laſts longer than whilſt it is clearing away the vitiated contents of the primæ viæ; ſuch as produce bitter, ſower and greaſy belchings, with diſtentions and ſtatuſes of the ſtomach.

It dilutes and diſſolves viſcious humours, obtunds and corrects acrimonious and bilious ones, and temperates acidities and inordinate fermentations; reſtrains effervеſcences of the blood, and recreates the ſpirits beyond any other medicines.

It greatly increaſes the momentum of the blood without heating it, and thereby proves an excellent deobſtruent in glandular infarctions and obſtructions; conquers ſcrophulous diſorders in young people, by mending the weak tone in the ſolids, and acting as an aperient, reſolvent, and a detergent; as a ſharpener of the appetite and a ſtrengthener of digeſtion.

It is ſo mild as ſeldom to diſagree with the moſt delicate conſtitutions, ſuch as can by no means endure any of the officinal preparations of ſteel; hence it is excellent in all hypochondriac and hyſteric complaints, and nervous diſeaſes; attenuating the circulating fluids and invigorating the ſolids, removing the green ſickneſs and the whole train of troubleſome ſymptoms, which ſo frequently precede the firſt eruption of the catamænia.

In diſorders of the breaſt, habitual coughs and aſthmas, it is of ſurpriſing efficacy, provided there be no ſpitting of blood, fierce hectic heat, or ulceration of the lungs; but in the firſt ſtages of conſumptions ariſing from a ſtrumous habit, as they oftener perhaps do than from any other cauſe in northern climes, a cure may be very reaſonably expected from a timely uſe of this water.

By its corroborating and bracing qualities it proves very ſtrengthening and beneficial to the inteſtines and lacteals, ſpleen, and liver; its efficacy in ſtopping beginning dropſies and reſtoring the tone of the lymphatics, may be depended upon, as alſo for reſtraining inordinate fluxes of the menſes, dyſenteries, and the fluor albus. Dr. Jurin in his letter to Dr. Hales greatly commends the uſe of chalybeats lightly acidulared, in the diabetes, for which diſorder Dr. Slare prefers them to the Briſtol water; but it will be proper to begin with the purging ſpring for a few days.

Our chalybeat has done remarkable ſervice in ulcers of the kidneys, and in bringing away gravel when obſtinately fixed, and ſtones of the bladder; but before it is ventured upon in theſe complaints, it will be highly neceſſary to be ſatisfied that the ſtone is not too large to paſs the urethra.

After continual fevers, and to prevent the return of agues, nothing may be more ſafely relied upon, if aſſiſted with ſtomachic bitters.

From what has been ſaid this chalybeat cannot fail (if taken under the direction of an intelligent phyſician, which may be abſolutely neceſſary in many circumſtances) of removing cachexies, jaundices, atrophies from infarctions of the meſentery, irregularities and ſuppreſſions of the menſes, as well as exceſſive fluxes of them and of the hæmorrhoidal veins, and in general all diſorders ariſing from viſcoſity or acrimony of the juices, whether in the primæ viæ or elſewhere, obſtructions, inordinate efferveſcence of the blood, relaxations, want of natural heat, nervous debilities, and ſizy and acrimonious humours, particularly irregular gouts and ſcorbutic rheumatiſms.

Directions to be obſerved in the uſe of the Chalybeat Water.

In plethoric conſtitutions, and ſuppreſſed menſes, bleeding to a moderate quantity will be properly premiſed; and if the ſtomach and inteſtines are clogged with viſcidities it will be beſt to take a vomit in the evening, and the next morning three glaſſes of the purging water; and the following day begin with a ſingle glaſs of the chalybeat, which may be increaſed, a glaſs a day, to four glaſſes, or five if it ſits well on the ſtomach, or paſſes off eaſily, whether by ſtool or urine, and cloſe the courſe with the purging water.

In ſcrophulous, rheumatic, and ſcorbutic complaints, alſo in coſtive habits, the purging water may be mixed with the chalybeat, or each drank alternately day by day; and the like in the ſtone and gravel.

If the chalybeat ſits ill on the ſtomach at firſt, ſwallowing carraway ſeeds, or dropping in a little tincture of cardamoms will reconcile it.

In cold weak ſtomachs the water may be made milk-warm, without impairing its virtue.

Uſe exerciſe between the glaſſes, but not to raiſe a ſweat, and avoid crude and flatulent diet through the whole courſe of drinking.

To conclude (in the words of Mr. REYNOLDS) "we cannot but reflect, with adoration, on the "goodneſs of that PROVIDENCE, whoſe mercy is "over all his works; who, in compaſſion to our "bodily infirmities, has bountifully ſupplied us "with thoſe ſalutary fountains in the neighbourhood "of this great metropolis."

APPENDIX.

ALTHOUGH the probable effects of mineral waters in particular diſorders may be rationally inferred, when their conſtituent principles are once well underſtood; yet as real facts are ever moſt convincing and ſatisfactory, I thought it not amiſs to annex a few caſes wherein theſe ſprings have proved of ſignal benefit. They are all taken from accounts taken either by the perſons themſelves, or their intimate friends, excepting one or two, which I relate upon my own knowledge.

Mr PEREGRINE PHILLIPS, an officer in the royal navy, being a long while ſtationed in America in the late war, contracted a moſt violent ſcorbutic diſorder, ſo obſtinate as not to give way to any medicines that were preſcribed to him by his phyſicians for years together: he was frequently covered over with cuticular eruptions, moſtly dry, though ſometimes with moiſt ſores, by which he found himſelf more relieved than by all the remedies he had uſed; for when his ſkin was cleareſt, and his ſores dried up, he was tormented with ſuch inward heat, pains of the ſtomach and inſuperable coſtiveneſs, that he wiſhed himſelf dead. As he imagined that his complaints aroſe from a cold cauſe, he was reluctant to try what waters would do for him, tho' adviſed to it by ſome of his friends. At length hearing what the Bagnigge waters had done in cutaneous foulneſſes, he determined to go into a courſe of drinking them, and accordingly began with the chalybeat; but finding after a few days uſe, that this water rather increaſed his coſtiveneſs, tho' it mended his appetite, he took to the purging water for ſome days, and afterwards drank them both mixed. When he began, his moſt alarming ſymptom was broad livid ſpots on his legs and thighs, which were alſo thick, and of a callous hardneſs, ſo that a ſurgeon he conſulted apprehended a mortification would enſue. However, in a week or ten days he found them ſoftened, and ſoon after they became ſcurfy and peeled off; his appetite returned as his coſtiveneſs abated, his former pains and heats vaniſhed, and his conſtitution, by the end of the ſummer ſeaſon of 1758 ſeemed quite renewed. However, at the beginning of 1759, he found there were ſome relicks ſtill to be eradicated, and had recourſe to the wells again early in the ſpring, and ſoon found himſelf ſet to rights again, and has continued well ever ſince. Nevertheleſs he is determined to drink the water once a year as long as his reſidence in London will allow him, for the ſake of freſh ſpirits and keen appetite they never fail to create.

The Hon. Mrs Oakover at about the age of fifty, begun to be troubled with a difficulty of breathing, had ſeveral times been at Tunbridge, and always found benefit; ſhe having heard of Bagnigge Wells, conſulted her phyſician, whether a courſe of thoſe waters might be entered upon with any hopes of ſucceſs? He was not againſt her trying them, and as ſhe lived not a great way from the wells, ſhe was determined to do it: This was the ſpring of 1759, at which time it was with great difficulty that ſhe could get in or out of her chariot, and was unable to walk up one pair of ſtairs, without reſting ſome minutes at the firſt landing place, before ſhe could proceed further; her appetite was wholly gone, ſhe was much emaciated, begun to be dropſical and her ſkin was tinged yellow all over. In this condition ſhe viſited the wells, and began with a ſingle ſmall glaſs of the chalybeat; the next day ſhe took two, afterwards three, adding a tea ſpoonful of the tincture of cardamoms to the firſt glaſs for ſome time. She continued the courſe for nine and forty mornings without interruption, at the end of which ſhe found herſelf relieved and free from her complaints. This relation I had from her huſband, the lady herſelf being walked abroad upon a viſit, tho' in very cold weather. He told me himſelf, that all their acquaintance could not but look upon this as an extraordinary cure; and to confirm the above account deſired I would call again, which I did, and had the ſame relation from the Lady herſelf.

Mr Davis, maſter of the academy at Iſlington, was many years troubled with weak and inflamed eyes, and a hard and thick ſwelling of his upper lip, which was ſometimes ſo enlarged as to lye almoſt even with his noſe, being covered with ſore eruptions. He drank the purging waters at the proper ſeaſon in 1757, and found that they never failed to work in the mildeſt manner, though ſufficiently, and without the leaſt griping or offence to his ſtomach. He perceived his lip to contract in ſize in a very ſhort time, and the diſorder in his eyes, which plainly appears to have been a ſcrophulous opthalmia, ſenſibly to abate: ſo that by the end of the ſeaſon he had no remains of his diſorder, but thought it beſt to renew his courſe the next ſeaſon to confirm his cure. He has ſo good an opinion of this purging water, that he takes the young gentlemen under his tuition to drink it twice a year at the proper ſeaſons.

Mr Cadwell, ſhoemaker, at the corner of Great Turnſtile Holborn, was for many years afflicted with a fierce hot humour that beſet moſt parts of the ſurface of his body, and was of ſo acrimonious a condition, that it ran out of the ſores of his legs, through his ſtockings: it would raiſe bliſters on his feet as if ſcalded with boiling water, and if he uſed any outward applications that repelled it, he felt miſerable pains in his ſtomach, bowels, and head. He had taken a world of medicines, beſides drinking ſea water for a long time to very little or no purpoſe; at length he drank the purging water at Bagnigge Wells, which ſoon altered the nature of the humour, his ſores became tolerable, and after a few weeks healed, his appetite and ſleep returned, and he obtained a perfect cure without any relapſe.

Mr William Leach of the Strand had a very troubleſome cutaneous diſorder, which was by his apothecary pronounced to be a leproſy, accompanied with inward heat, frequent and ſudden anxieties, and reſtleſsneſs in bed. When he undreſſed himſelf handfuls of ſcales would fall off, and the itching was ſcarce endurable; in 1757 he went to drink the ſea water, and continued it the whole ſeaſon without viſible amendment. In 1758, he began with this purging water, and drank it every day; ſometimes three or four glaſſes as a purge, at others one or two, as an alterative, in which courſe he perſiſted two months, which quite conquered the complaint, and his ſkin is now as clear as ever it was in his whole life.

Mr Tring, gardener near Old Street, was for eight or nine years afflicted with a very painful diſorder, which every one that he had conſulted took for a rheumatiſm, or lumbago dorſalis: all medicines that he took rather aggravated than aſſuaged his pains, which at laſt ſeemed fixed altogether to his loins, ſo that he could not follow his buſineſs, nor even raiſe himſelf without help when he was ſeated. He was willing to try what the Bagnigge waters would do, and firſt begun with the purging ſpring, but ſoon changed that for the chalybeat, which not only ſoon was the means of informing him what his real diſorder was, but likewiſe afforded him ſpeedy relief; for he voided daily amazing quantities of gravel, and thick gelatinous ſlime, and as he did ſo, perceived a proportionable abatement of his pains, and in a few weeks became perfectly eaſy, acquired a good appetite and digeſtion, and found himſelf improved in his conſtitution, and fixed in ſuch a ſtate of health as he had not known for many years.

Mr Mills, maſter taylor over againſt St Dunſtan's church Fleetſtreet, was troubled with much the ſame kind of pains as Mr Tring in the caſe laſt related, and withal had a ſecret provocation to urine, but could void little at a time, and that followed with great uneaſineſs about the neck of the bladder, which he took for the ſtrangury. He had taken various medicines from his apothecary, but found no manner of benefit. After all, he drank the purging waters, which at firſt anſwered no otherwiſe he ſaid, than making him chearful, and giving him a good appetite, which therefore induced him to continue them. At length he perceived a very acute pain as he was making water, which ſuddenly ſtopped the ſtream, but upon another effort, the urine iſſued, and he heard ſomething fall into the chamber pot, which proved to be a ſtone, and the next day but one he voided another. Theſe ſtones he ſhewed me; they were then of the ſize and ſhape of a ſcarlet bean, but were at firſt much bigger. He continued this water to the end of the ſeaſon, and has been well ever ſince.

Captain J—h Br—s had been troubled with a very obſtinate gleet from a wrong treatment of a virulent gonorrhea, which rather increaſed than abated after three years uſe of internal and topical remedies, beſides the cold bath. During the five or ſix laſt months, the oozing liquor was as colourleſs as gum-water, and almoſt as thin; whence it was apprehended that the oſtiolæ of the urethral lacunœ were conſumed, and his caſe was looked upon as incurable. In March 1759, he began drinking the Bagnigge chalybeat; in leſs than three weeks he perceived the running much decreaſed, and by the end of May diſappeared entirely. He perſiſted in his courſe through the reſt of the ſeaſon, and has never ſince, as he very lately aſſured me, been troubled with the leaſt return of his diſorder, but enjoys ſuch a conſtant health and flow of ſpirits as he was a ſtranger to for many years before.

Mrs Mary West, hatter of Monmouth-ſtreet, contracted from a ſurfeit a moſt ſevere cutaneous diſorder, wherewith her face was chiefly affected, being ſwoln to a monſtrous degree, ſo as in appearance to reſemble an eryſipelas, but without any of the ſymptoms commonly previous to that diſeaſe, as ſhivering, proſtration of ſtrength, &c. or any concomitant fever. This tumour was attended with intolerable itching, and in a ſhort time threw off abundance of white ſcales, like the leproſy, which were conſtantly renewed. After taking purges, and other ſhop medicines, with liniments, without benefit, ſhe had recourſe to the purging waters at Bagnigge; which ſhe had ſcarce uſed three mornings before the ſwelling quite ſubſided, the branny ſcurf waſted, and her natural complexion gradually returned in ſo ſhort a time, that it was ſurprizing both to herſelf and her neighbours.

Elizabeth Deane of Deptford, widow, aged fifty five, about four years ago firſt felt in her left breaſt a ſmall moveable hard knot, as ſhe called it, of the ſize of a hazle nut, which continued much the ſame twelve or fourteen months, with little or no pain. It appears that this was an occult cancer, for on a ſudden its bulk increaſed, and it grew enormouſly larger and larger, with frequent and intolerable darting pains. About a year and half ago, it was perceived to be fixed at the bottom, and ſoon after was knotty and uneven towards the ſurface, and looked of a livid complexion under the ſkin, which made the poor woman apprehend it would in time corrode and eat its way through. A relation who lived at Kentiſh-Town, telling her that ſhe had received great benefit from the Bagnigge purging water in a hard tumour of her breaſt, Mrs Deane was willing to try it, and prevailed upon her brother to fetch her a large ſtone bottle of it once a week. She drank at the rate of a quart, and ſometimes three half pints a day, which kept her body juſt open. In leſs than a fortnight the ſhooting pains were at an end, and in ſix weeks the tumor was much reduced. In September laſt it became looſe again, as it continues at preſent, being now ſcarce half ſo big as a cheſnut, giving her little or no uneaſineſs, except ſometimes upon taking

cold,

cold, and then two or three pints of the water never fail to relieve her.

Mrs. Mills, wife of the above mentioned Mr. Mills, was for a good while together troubled with an habitual vomiting, and alſo at times with pains of the ſtomach, and a total loſs of appetite. It was very rare that ſhe could retain what ſhe eat at dinner, longer than an hour or two. As ſhe frequently accompanied her huſband to the wells, by his perſuaſion ſhe drank the purging waters along with him, and in a little time her vomitings and ſtomach pains left her, the appetite was reſtored, and ſhe is now able to eat and digeſt more in one day, than ſhe had uſually done in a week.

A clergyman near town, upon the interruption of the accuſtomed return of a fit of the gout, fell into a hypochondriac melancholy, for which he was adviſed to take Dr Lower's bitter infuſion, with ſteel, and exerciſe himſelf every day on horſeback. He kept to this regimen ſeveral months without any apparent benefit. Afterwards he drank of a chalybeat ſpaw in the ſpring 1758, and repeated it at intervals moſt part of the ſummer, with no better ſucceſs. The laſt year he began with the Bagnigge purging water, and took three half pints every other morning for three times, which wrought eaſily, and without fluttering his ſpirits in the leaſt: then he took to the chalybeat, beginning with two half pint glaſſes each morning, which in a few days he increaſed to four, but never exceeded that quantity. At a month's end he was ſo well reconciled to his medicine, that he propoſed to continue it through the ſummer ſeaſon, but was admoniſhed by his phyſician to deſiſt. He continued the whole autumn and winter in good ſpirits, and ſlept well. Soon after Chriſtmas this year, a fit of the gout returned, which proved a pretty ſmart one, but of moderate duration; and he now finds himſelf in better health than he has enjoyed for ſeveral years paſt.

POSTSCRIPT.

To Sir CHRISTOPHER MEIGHAN, M. D.

Dear Sir,

ALTHOUGH in your *Enquiry into the cauſe of heat in bituminous waters*, you allow thoſe of Aix-la-Chapelle to be *purely ſulphureous*, * nay, that *they abound with ſulphur, found ſticking to the rooſs of their conduits*; yet I remember you told me, upon hearing what I advanced concerning ſulphur in the chalybeat water of *Bagnigge*, you doubted of the natural exiſtence of ſulphur in waters, and that you was confident it could not *formally* or *palpably* be found in them; for this reaſon, if I remember right, that it is inconſiſtent with the true principles of chemiſtry that water can be a diſſolvent of ſulphur.

Now Sir, I believe, none knows better than yourſelf what operations nature can, and does, in a thouſand inſtances, perform in her own elaboratory, ever in vain attempted in thoſe of the chemiſts. But to ſhew you that ſulphur may be, even artificially, diſſolved in water, that is, ſo intimately mixed therewith, as to preſerve the water clear and colourleſs, like a ſolution of ſilver in aqua fortis, and exhibit ſufficient tokens thereof, both to the taſte and ſmell, the following ſimple and eaſy experiment may perhaps ſuffice.

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* Page 196.

Take thirty or forty brimſtone matches; kindle and extinguiſh them ſeperately in five or ſix ounces of clean water; ſmell to this water, and the ſcent of the ſulphur will be maniſeſt; taſte it, and the ſulphureous gas will as plainly diſcover itſelf to your palate.

Similar to this, Mr HENRY BARTON preſented to the Medical Society in Dublin, an artificial ſulphureous water, being a real ſolution of ſulphur, which had all the marks of the natural ſulphureous waters, and from which Dr RUTTY affirms, that himſelf precipitated a *lac ſulphuris* by ſpirit of vitriol, and yet it was as tranſparent as common water: He adds, that in imitation thereof, he made a ſolution of twenty one grains of *hepar ſulphuris* in a quart of ſoft water, which retained its tranſparency, and agreed to the natural ſulphureous waters in the flavour, and particularly in the fetid ſmell, upon adding ſpirit of vitriol to precipitate the ſulphur.

And for poſitive proofs of the exiſtence of a *formal* and *palpable* ſulphur in waters, pleaſe to take the following relations.

The celebrated Abbè NOLLET, who, in queſt of natural knowledge, made the tour of Italy near twenty years ſince, in the account he afterwards publiſhed of his travels, ſays, " about fourteen " miles from Rome in the way to Tivoli, you croſs " a rivulet four or five feet broad, and about as " many deep, whoſe water, being a pretty rapid " ſtream, ſmells ſtrongly of ſulphur, whence it is called *aqua zolfa*. This ſcent extends to a great " diſtance all round, eſpecially when wafted by a " wind not violent enough to diſſipate it: It is reported, that at certain times, moſtly in the night, " the offenſive ſtench is perceptible as far as Rome " itſelf. Theſe ſulphurated ſprings are not uncommon in Italy; round Viterbo they are ſometimes " very offenſive to travellers; I met with ſuch going from Rome to Naples, on the road below Sermonetta, and the ſulphureous odour which attacks you in different places, as the wind happens to convey it, is a ſufficient proof that the " country abounds in ſuch waters; they are for the " moſt part warmer than the air, of a milky or opaline hue, and their vapour penetrates the hardeſt " ſtones, and incruſts them with flowers of ſulphur."

Mr ADDISON in his travels ſays, " he ſmelt " the ſtench of the ſulphury rivulet ſome time before he ſaw it, and that the little lake that gives " riſe to it, lies in the very flat of Campania; and, " as it is the drain of theſe parts, 'tis no wonder that " it is ſo impregnated with ſulphur."

Another water of the ſame kind, is deſcribed by Dr GUETTARD of the Royal Academy of Sciences at Paris; " In Canada is a ſtream running from a " mountain; when it rains, it ſends forth an extremely " diſagreeable and offenſive ſmell of ſulphur: The " water itſelf is clear, but has a milky hue from a

" white pellicle which covers it, and it alſo de-
" poſits a whitiſh ſulphureous earth on the roots of
" the trees or pieces of wood in its channel; and
" when thoſe pieces of wood are well dried, they
" take fire as ſuddenly as common matches, and
" being burnt in a chamber, emit a ſuffocating
" ſmell of ſulphur, and burn with a blue flame:
" The water is drank for the cure of the itch,
" tetters, and weakneſſes of the ſtomach, and ap-
" plied externally.

These inſtances, Sir, of which I could furniſh ſeveral more, may, I hope, ſatisfy you of the real exiſtence of *formal and palpable* ſulphur in waters. Your candour I know, will excuſe the liberty I take, being,

Dear Sir,

Your affectionate

and moſt obedient

humble Servant,

May 1,
1767.

J. BEVIS.

F I N I S.